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PROFESSIONAL AND SUPPORTING PERSONNEL, A REPRINT FROM THE 1967 MANPOWER REPORT.

MANPOWER ADMINISTRATION (DOL), WASHINGTON, D.C.

PUB DATE 67

EDRS PRICE MF-$0.25 HC-$1.32 31P.

DESCRIPTORS- FEDERAL LAWS, MANPOWER UTILIZATION, *EMPLOYMENT TRENDS, HEALTH PERSONNEL, *EDUCATIONAL NEEDS, EDUCATIONAL PROGRAMS, PROFESSIONAL EDUCATION, *EMPLOYMENT OPPORTUNITIES, *SUBPROFESSIONALS, TECHNICAL EDUCATION, GRADUATE EDUCATION, COLLEGE GRADUATES, SCIENTISTS, ENGINEERS, TEACHERS, SOCIAL WORKERS, *PROFESSIONAL PERSONNEL,

MANPOWER REQUIREMENTS, RESOURCES, UTILIZATION AND TRAINING IN SCIENCE AND ENGINEERING, TEACHING, SOCIAL WORK, AND THE HEALTH PROFESSIONS ARE DISCUSSED. EMPLOYMENT IN PROFESSIONAL AND TECHNICAL AREAS INCREASED FROM FEWER THAN 4 MILLION IN 1947, TO MORE THAN 9 MILLION IN 1966, FIVE TIMES THE RATE OF INCREASE IN EMPLOYMENT GENERALLY. MOUNTING EMPLOYMENT OF PROFESSIONAL AND TECHNICAL PERSONNEL WAS BOTH A CAUSE AND A CONSEQUENCE OF THE COUNTRY'S ADVANCING ECONOMY AND TECHNOLOGY. PERSONNEL SHORTAGES EXISTED IN (1) MAJOR HEALTH AND SUPPORTING PROFESSIONS, (2) SLUM, RURAL, AND SOME SMALL COLLEGE TEACHING POSITIONS, (3) SPECIALTIES SUCH AS AUTOMATIC DATA PROCESSING, MATHEMATICS, DESIGN ENGINEERING, COUNSELING, SOCIAL WORK, AND LIBRARY SCIENCE, AND (4) LOCAL AND STATE GOVERNMENT AGENCIES. MANPOWER REQUIREMENTS WILL CONTINUE TO GROW MUCH FASTER IN PROFESSIONAL AND TECHNICAL OCCUPATIONS THAN IN OTHER MAJOR OCCUPATIONAL GROUPS DURING THE NEXT DECADE, PERHAPS REACHING 13 MILLION BY 1975. MANPOWER NEEDS ARE EXPECTED TO RISE IN PRACTICALLY EVERY PROFESSION WITH GREATER INCREASE IN NATURAL SCIENCES AND ENGINEERING FIELDS THAN IN LAW AND TEACHING. AMONG THE RECOMMENDATIONS WERE TO (1) RAISE PAY SCALES IN MANY OF THE TECHNICAL AND PROFESSIONAL FIELDS, AND (2) TAKE MEASURES TO EASE ADJUSTMENT PROBLEMS DUE TO SHIFTS IN DEFENSE AND GOVERNMENT PROGRAMS. THIS ARTICLE IS A REPRINT FROM THE "1967 MANPOWER REPORT" (VT 002 577) AND IS AVAILABLE FROM MANPOWER ADMINISTRATION, OFFICE OF MANPOWER POLICY, EVALUATION, AND RESEARCH, U.S. DEPARTMENT OF LABOR, 14TH STREET AND CONSTITUTION AVENUE, N.W., WASHINGTON, D.C. 20210. (WB)

PROFESSIONAL AND SUPPORTING PERSONNEL

A REPRINT FROM THE 1967 MANPOWER REPORT

U.S DEPARTMENT OF LABOR · Manpower Administration

CONTENTS

Professional and Supporting Personnel

The President sends to the Congress each year a report on the Nation's manpower as required by the Manpower Development and Training Act of 1962. Published together in that report are the *Manpower Report of the President* and an accompanying comprehensive report by the Department of Labor on manpower requirements, resources, utilization, and training.

This is a reprint of the chapter on Professional and Supporting Personnel from the Department of Labor's report.

Information regarding reprints of other sections of the *1967 Manpower Report* may be obtained at the locations listed on the inside back cover.

PROFESSIONAL AND SUPPORTING PERSONNEL

Mounting employment of professional and technical personnel is both a cause and a consequence of this country's advancing economy and technology. The rapid pace of scientific discovery and technological innovation during the past two decades has been at once the achievement of scientists and engineers and a source of added demand for their services. Technological advances also underlie the rise in consumer incomes, which has, in turn, contributed greatly to the soaring demand for educational and health services. In addition, national objectives in defense, space exploration, the War on Poverty, and attacks on manifold other domestic problems have generated new and larger personnel requirements in a wide spectrum of scientific, engineering, and human-service professions.

Thus spurred by demands from many sources, professional and technical employment has had an extraordinary growth—to more than 9 million in 1966, from fewer than 4 million in 1947. This increase of well over 100 percent was five times the rate of increase in employment generally since 1947. But even so, the supply of professional and technical workers still falls short of meeting national needs in many fields.

The very low rate of unemployment of professional workers is one indication of their scarcity. Only 1.3 percent of all professional and technical workers were unemployed in 1966. This rate of joblessness was one-third the average rate for workers in all occupations. It suggests a level of unemployment in the professions below the frictional minimum associated with economic stability and efficient functioning of the job market.

There is also direct evidence of personnel shortages in many specialties. To cite a few examples:

—Widespread shortages are reported in all the major health professions and in many supporting professions. Unmet needs for physicians exceed 20,000. A great many hospitals have nursing vacancies they cannot fill.

—Great numbers of children, especially in slums and rural areas, are in oversized classes or classes taught by inadequately trained teachers, because their schools cannot recruit enough fully trained personnel.

—Many small colleges are unable to recruit enough qualified teachers in physics, mathematics, economics, and other fields.

—Unmet personnel needs have been reported also in specialties ranging from automatic data processing occupations, mathematics, and design engineering to counseling, social work, and library science.

—Difficulties in staffing professional and technical positions are acute in some State and many local government agencies.

The factors responsible for these personnel shortages differ markedly among specialties, as made plain later in this chapter. All major professions stand to benefit, however, from the sharply accelerated rise in college graduations which will start in 1968.

As the young people born in the years of high birth rates since World War II reach college grad-

uation age, the supply of highly educated men and women will mount—first at the bachelor's degree level and, a few years later, at the advanced degree level. Within a few years, the overall supply of professional personnel is likely to come much closer to meeting economic and social needs than it has during the past two decades.

This potentiality will not be realized automatically, however. To achieve it will require expanded educational facilities, improved counseling and guidance, removal of discriminatory barriers, and other aids to education and effective manpower utilization. And even expanded educational facilities and services and increases in the number of students may not meet society's urgent needs if their fields of training do not match these requirements.

This chapter considers first the growth in professional manpower requirements and in college graduations in prospect over the next decade. It points to some of the directions of action needed to reap the benefits of a potential increase in highly educated manpower that is without parallel or precedent. Later sections discuss in more detail the current and prospective manpower situation and needed program developments in several important fields—sciences and engineering, teaching, social work, and health occupations.

Manpower Demand and Supply in the Professions

THE GROWING DEMAND FOR PROFESSIONAL PERSONNEL

Manpower requirements will continue to grow much faster in professional and technical occupations than in any other major occupational group during the next decade. This conclusion, indicated by earlier studies, is confirmed by the Department of Labor's most recent employment projections.

Employment requirements may reach nearly 13.0 million in professional and technical occupations by 1975. If achieved, this level of employment would represent an increase of nearly 40 percent above the 1966 figure of 9.3 million professional and technical employees. It would involve nearly twice as rapid an employment increase as is projected for all occupations (20 percent). Manpower needs are expected to rise in practically every profession—though much faster in some fields (for example, the natural sciences and engineering) than in others (such as the law and schoolteaching).

Efforts to project future manpower requirements are a difficult and dangerous undertaking in view of the great variety of technological, economic, political. and other developments which may affect these requirements. The figures are approximations only, and caution in their interpretation is in order.

The basic assumptions which underlie the projections must also be borne in mind. Though discussed in the preceding chapter, several of these assumptions affect the significance of the findings as to warrant reiteration here.

First of all, the Department's projections assume substantially full employment of the growing labor force (here defined as an unemployment rate of approximately 3 percent). They assume that the rapid scientific and technological progress of recent years will continue, and that expenditures for research and development will continue to grow, although at a slower rate than during the 1950's and early 1960's. And they assume a level of defense expenditures like that prevailing in 1964. Thus, the indicated growth in professional employment can be regarded as excluding the added personnel demands generated by the Vietnam war.[1] In essence, the projections represent the pattern of manpower requirements regarded as most probable and feasible under peacetime, full-employment conditions.

With an increase in professional and technical personnel of the magnitude projected, enough highly trained workers would be available to permit further advances in the national standard of

[1] For a further discussion of the methodology and assumptions underlying these projections, see *America's Industrial and Occupational Manpower Requirements, 1964–75* (Washington: U.S. Department of Labor, Bureau of Labor Statistics, 1966), pp. 5–8.

living. The projections imply moderate progress in levels of education and in health care, housing, and the provision of other goods and services for the expanding population.

Even the rapid growth in the professional work force called for by these projections would be less than optimum, however, according to a study which approaches manpower needs from a very different vie . point—namely, the requirements for achieving an illustrative set of national goals designed to provide overall improvement in the conditions of American life.

This study had its genesis in 1960, when the President's Commission on National Goals listed goals in 15 areas of national activity.[2] The needs in each of these areas were later formulated by the National Planning Association, which is now completing a study of the manpower implications of the goals for the Department of Labor.

One important conclusion of the study is that full attainment of all the "aspiration goals" by 1975 would require more workers and other resources than this country will have. Much progress would be possible toward all or most of the goals, but choices would have to be made and priorities established, based on an assessment of resources, costs, and benefits.

In these choices, special attention would need to be given to the implied demand for professional personnel. It is estimated that to reach all the aspiration goals by 1975 would require about 15.8 million professional and technical workers.[3] This would be over 6.5 million more than were employed in 1966. It would also represent a level of professional and technical employment nearly 3 million higher than is indicated by the Department's manpower requirements projections. The national goals study thus underlines the prospect of further rapid growth in demand for professional and kindred workers, if the Nation continues to give high priority to social progress of the kinds called for by these aspiration goals and makes the implied, tremendous commitment of resources to them.

THE GROWING SUPPLY OF COLLEGE GRADUATES

A great rise in the number of college graduates made possible the tremendous expansion in professional employment during the past two decades. In 1965, 539,000 bachelor's and first professional degrees were awarded—a gain of over 100,000 in just 3 years and of more than 250,000 since 1955. (See chart 26.)

This increase in graduations partly reflected a moderate rise in the college-age population, but it resulted to a much greater extent from growing demand for college education. For far-reaching economic and social reasons, the proportion of young people wishing to go to college has been rising steadily. Nevertheless, a great many capable young people still do not even enter college. In 1965, according to U.S. Office of Education data, little over half the high school graduates in the country went on to college; the percentage ranged from as many as two-thirds of the graduates in States with a well-developed system of free or inexpensive higher education to as few as one-third of them in States with inadequate facilities for higher education. For poor and even for middle-class youngsters in States without readily accessible and inexpensive opportunities for higher education, lack of funds was obviously a major deterrent to college attendance.

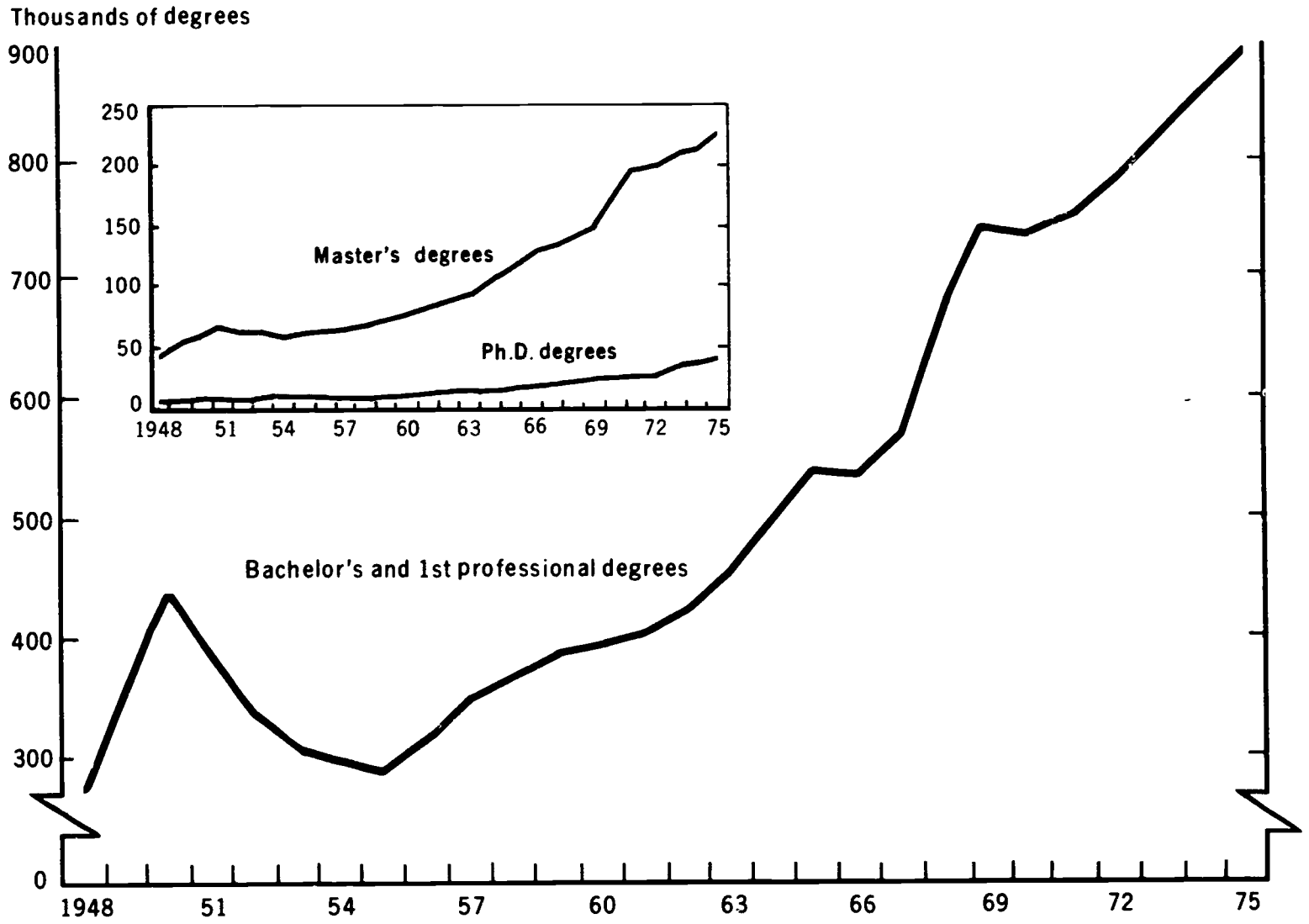
The new financial aid programs for college students (discussed later in this chapter) are now helping to remove obstacles to the higher education of able but impoverished youth. And the establishment of many new colleges supported by State and local governments a id Federal facilities grants is making such educatio n much more widely available. These developments, coupled with the growing importance of college education as preparation for employment, should insure continued growth in the proportion of young people obtaining college degrees. In addition, the rise in the college-age population has accelerated sharply and will not level off till late in the decade.

[2] The goals were increased to 16 the following year with the addition of space exploration, and are as follows: (1) Agriculture, (2) area redevelopment, (3) consumer expenditures and savings, (4) education, (5) health, (6) housing, (7) international aid, (8) manpower retraining, (9) national defense. (10) natural resources, (11) private plant and equipment. (12) research and development, (13) social welfare, (14) space, (15) transportation, and (16) urban development. See Leonard A. Lecht, *Goals, Priorities, and Dollars—The Next Decade* (New York: The Free Press. 1966).

[3] See app. table E–11.

CHART 26

Number of new college graduates will rise sharply in coming decade; number of master's & Ph.D. degrees will double.



Source U S Department of Labor, based on data from the U S Department of Health, Education, and Welfare

Thus, a sharp spurt in college graduations beginning in 1968 can be regarded as a certainty—short of a major war or other catastrophe invalidating all predictions. The number of graduate degrees awarded is likely to increase even more rapidly in view of the mounting employer demand for people with graduate degrees and the correspondingly heavy student demand for graduate training. Projections by the Office of Education show an increase of about two-thirds in the number of bachelor's and first professional degrees awarded between 1966 and 1975, and a doubling in the number of master's and Ph. D. degrees. (See table 1.)

An expansion in the college-educated population of this magnitude would be of fundamental value in developing a better informed citizenry and a more productive work force.[4] And it has justification also in terms strictly of requirements for highly specialized manpower. The Department of Labor projections already cited indicate an increase of around 4 million in requirements for professional, technical, and kindred workers between 1965 and 1975. In addition, a very large number of new entrants—probably 3 million during this 10-year period—will be needed to

[4] It has been estimated that two-fifths of the rise in national output per worker over the period 1929–57—a gain of 56 percent—is attributable to the increasing education of the work force. See Edward F. Denison, *The Sources of Economic Growth in the United States and the Alternatives Before Us* (New York: Committee for Economic Development, 1962), Supplementary Paper 13, p. 73. For additional discussion, see also Theodore W. Schultz, *Investment in Poor People* (Washington: U.S. Department of Labor, Manpower Administration, Office of Manpower Policy, Evaluation, and Research, December 1966), Seminar on Manpower Policy and Program

TABLE 1. ACTUAL AND PROJECTED EARNED DEGREES, 1965 TO 1975

Year ending June 30	Bachelor's [1]	Master's [2]	Doctor's
1965	539,000	112,000	16,500
1966	540,000	126,000	17,500
1968	678,000	135,000	21,800
1970	742,000	174,000	24,800
1975	902,000	222,000	35,800

[1] Includes first professional degrees (e.g. master's degrees in library science and social work and doctorates in medicine and dentistry) where the degree has not been preceded by a lower professional degree. In 1965, first professional degrees involving 5 or more years of college study represented 8.5 percent of the total number.

[2] Also includes other second level degrees.

SOURCE: U.S. Department of Health, Education, and Welfare, Office of Education.

replace workers who die, retire, or withdraw from the labor force for other reasons.

In comparing these projections of requirements with those on the supply of new college graduates, two other highly uncertain factors must be allowed for—namely, how many of the new college graduates will enter professional and kindred occupations and, conversely, how many of the job openings in these fields will be filled by college graduates. Recently, about two-thirds of the bachelor's degree graduates have entered professional and kindred occupations, and it is here assumed that this proportion will remain about the same over the next 10 years. On the other hand, a moderate increase in the proportion of professional and related jobs filled by college graduates has been allowed for, since people without a bachelor's or higher degree are finding it steadily more difficult to enter such employment.

On this basis, and in the most overall terms, the supply of college-educated personnel will probably be in balance with the demand in professional and related occupations over the next decade as a whole. This does not mean, however, that supply will meet requirements in all professional fields—particularly in the next couple of years, before the spurt in graduation takes place. Persistent personnel shortages are likely in some fields, unless special efforts are made to increase the numbers of new entrants (as indicated in the discussions of several professions later in this chapter).

Furthermore, the projected overall supply of college graduates would fall short of the possible needs for professional personnel suggested by the National Goals project. The aspiration goals developed through this project are only one illustration of possible social objectives for the Nation. Nevertheless, the finding that professional personnel resources would be one of the limiting factors if a national effort were mounted to achieve these goals has broad implications for educational policy. It makes evident the crucial relation of the levels of professional education to the pace of economic and social progress.

EDUCATIONAL SUPPORT PROGRAMS AND CONTINUING NEEDS

The educational legislation of the past 4 years has opened the door to the essential strengthening of higher education. College and university facilities are being much expanded and improved with the funds for new construction and rehabilitation of facilities available under the Higher Education Facilities Act of 1963. Professional education in health fields is being aided by facilities grants and financial aid to students provided for by several acts (the Health Professions Educational Assistance Act of 1963, the Nurse Training Act of 1964, and the 1964 amendments to the Public Health Training Act). And most important of all, under the Higher Education Act of 1965, funds have been made available to help colleges and universities provide community services, to improve libraries, to strengthen young or weak colleges, to give financial assistance to students, to strengthen and improve undergraduate instruction, and to aid construction of needed facilities.

The Federal aid to higher education available under these acts will need to be continued and enlarged over the next 10 years in order to provide such education for the young people who will be seeking it. In recent years, enrollments have been increasing much more rapidly in publicly supported than in private institutions. As the rise in college enrollments accelerates, this divergence in trends is bound to become wider in view of the severe limitations on private funds. Private institutions will certainly expand, but publicly supported institutions will be expected to accommodate an increasing proportion of the growing undergraduate and graduate enrollments.

And if this is to be done without sharply raising student fees, increased Federal aid will be necessary. The added facilities and other resources necessary to keep pace with the expected enrollments cannot otherwise be furnished by States or municipalities, unless alternative means of financing higher education are devised. Federal aid is and will continue to be of particular importance in reducing the severe differences in opportunities for higher education among regions and States.

Student Financial Aid

Lack of funds to meet college expenses has been a serious obstacle to college attendance among youth from low- and middle-income families. Great progress is underway, however, in overcoming financial barriers, through new and expanded Federal programs.

Under the College Work-Study Program, begun in 1965 under the Economic Opportunity Act, aid is provided in the form of on-campus and off-campus jobs. Through the Educational Opportunity Grant program, authorized by the Higher Education Act of 1965, outright grants (ranging from $200 to $1,000) are made to exceptionally needy high school graduates who could not otherwise attend college.

In addition, there are two loan programs. The first of these was initiated in 1958 under the National Defense Education Act. It provides direct Government loans to high school graduates admitted to a college and also to college students needing financial help.

An insured private loan program is also provided for under the Higher Education Act. Eligible students needing financial assistance for a college education are helped to get low-cost loans from participating financial institutions. The Federal Government guarantees the loans and contributes part of the interest payments.

The newest program, set up under the Veterans' Readjustment Benefits Act of 1966, authorizes aid for up to 36 months of college or other institutional training for veterans who have had military service since January 1, 1955.

These new and expanding programs made possible an increase in the number of grants and loans to students from 334,000 in fiscal 1965 to 846,000 in fiscal 1966. (See table 2.) Budget projections call for further increases, chiefly in the two newest programs, to a total of nearly 2.2 million loans and grants in 1968.

With increases of this magnitude, aid should be available for the great majority of students who need help in meeting college expenses. However, as experience accumulates, program accomplishments should be carefully reviewed and evaluated to make sure that the mix of grants and loans, public and private, is appropriate to the needs of all students, especially those from the lowest income groups.

TABLE 2. FEDERAL GRANTS AND LOANS TO COLLEGE STUDENTS, FISCAL YEARS 1965–68

[Thousands]

Grants and loans	Actual		Estimates	
	1965	1966	1967	1968
Total grants and loans [1]	334	846	1,782	2,176
NDEA direct Federal loans	317	400	435	437
Insured private loans	----------	105	480	750
Work-study grants	----------	190	191	226
Educational opportunity grants	----------	134	221	285
Veterans Administration grants [2]	17	17	455	478

[1] The number of individuals aided is smaller because some students receive several types of aid.

[2] Includes aid to war orphans, benefits for veterans of Vietnam war, and vocational rehabilitation of disabled veterans.

SOURCE: *Special Analyses Budget of the United States, Fiscal Year 1968* (Washington: Executive Office of the President, Bureau of the Budget, 1967), p. 99.

TABLE 3. PREDOCTORAL FELLOWSHIPS SUPPORTED BY FEDERAL FUNDS, FISCAL YEARS 1960, 1963, AND 1966

Agency	1960	1963	1966
Total	7,552	13,470	30,540
National Science Foundation	2,155	2,904	8,040
National Aeronautics and Space Administration	----------	886	3,646
Public Health Service	2,272	4,366	6,360
National Institutes of Health [1]	1,600	3,000	4,000
Other	672	1,366	2,360
Atomic Energy Commission	231	289	500
U.S. Office of Education (National Defense Education Act programs)	2,894	5,025	11,994
Foreign language	474	1,000	1,500
Humanities, social sciences, education	1,510	2,250	5,877
Natural sciences and engineering	910	1,775	4,617

[1] National Institutes of Health estimates exclude trainees under general research support grants, mental health service fellowships, and non-Ph. D. candidates. Other predoctoral traineeships are included.

SOURCE: *The National Science Foundation, A General Review of Its First 15 Years*, Report of the Legislative Reference Service of the Library of Congress to the Subcommittee on Science, Research, and Development (Washington: 89th Cong., 1st sess., U.S. House of Representatives, Committee on Science and Astronautics, 1965), Committee Print, p. 160. Also the Atomic Energy Commission.

Graduate Student Stipends and Orientation of Graduate Education

The college students desiring to continue their education past the baccalaureate and needing financial aid to do so are increasing rapidly in both relative and absolute numbers. Between 1961 and 1965, for example, the proportion of college freshmen who reported plans to earn a graduate degree rose from 49 to 67 percent—a very large increase for such a short time period.[5] Underlying this trend is, of course, students' perception of the growing employer demand for people with graduate degrees—evident, for example, in school as well as college teaching, in engineering as well as the sciences, and in many social sciences and human-service professions

Greatly increased support for graduate education, chiefly from Government sources, has been essential to convert the potential student demand for such education into mounting enrollments. In fiscal 1966, approximately 118,000 individuals received Federal aid for graduate and professional training, either through fellowships and traineeships or as research assistants on federally supported university research projects. Some 31,000 of them held predoctoral fellowships. (See table 3.)

Since doctoral training is prolonged and comes at an age when the students may have families to support, the availability of stipends can have a crucial effect in determining the numbers of new doctorates awarded. In 1965, about 80 percent of all full-time graduate students in science and engineering were receiving financial support through fellowships or research or teaching assistantships, and approximately half of this group were being aided by federally financed programs. In contrast, only about 45 percent of the full-time graduate students in other fields had any stipends, and of these only 1 out of every 5 was financed by the Government.[6]

The emphasis on the natural sciences and engineering in Federal fellowship programs reflects the Government's concern for increasing the supply of highly qualified research and development (R&D) personnel, chiefly for the defense, space, atomic energy, and health programs. Between 1960 and

[5] Alexander Astin, *Trends in the Characteristics of Entering College Students, 1961-65* (Washington: American Council on Education, 1966). ACE Research Report, Vol. 1, No. 4

[6] John K. Folger, "The Balance Between Supply and Demand for College Graduates," unpublished paper prepared as part of the work of the Commission on Human Resources and Advanced Education, 1966, pp. 2-3.

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'966, when the number of federally aided predoctoral fellows quadrupled, the proportion in the physical and life sciences and engineering remained roughly 3 out of every 4. This was true despite the National Science Foundation's growing support for social science training.

The importance of continued expansion in student support in the natural sciences and engineering is plain, in view of the personnel shortages and rising manpower requirements in these fields (discussed in the following section). But special consideration should be given to increasing fellowships and traineeships in the social sciences, humanities, and related fields. Probably the largest unmet needs for persons with doctoral training, both present and prospective, are in college and university faculties. And here, natural scientists and engineers are outnumbered 3 to 1 by members of other disciplines. The basic concern, however, is to provide, in sufficient numbers, the highly qualified, creative personnel required to cope with the immensely difficult and dangerous political and social problems which are, in part, a byproduct of scientific advance.

STATE AND LOCAL GOVERNMENT PERSONNEL NEEDS

The need for highly qualified professional and supporting personnel is nowhere more acute than in State and local governments. Soaring requirements for professional personnel in these agencies during the past two decades have mainly reflected the need to expand and upgrade services in education and in public health; and to a lesser degree the need for expanded services in highway construction, police and fire protection, natural resource and recreational facilities development, and other traditional service areas for State and local agencies.

These requirements have been augmented by the need for capable people to staff the many new federally aided programs dealing with urgent social needs, which depend on State and local government agencies for their implementation. These needs have grown as States and localities have accepted the responsibilities implicit in Federal programs and have developed additional measures to alleviate community problems.

With these expanded responsibilities has come the realization that current programs for training personnel in human-service fields, in public administration, and in related social science disciplines are far too small to meet current needs. For example, the Nation's graduate schools have been awarding only about 400 degrees in public administration in recent years, and the training provided has not always been relevant to the needs of government agencies.

To meet the needs of the Federal-State partnership for more highly qualified personnel, the President has recommended that new legislation be enacted to provide broadened educational and training opportunities for students planning careers in the public service and for public employees who desire to improve their skills. Provision should be made also for financial and technical assistance to strengthen State and local government personnel management and to permit interchange of personnel between State and local governments and the Federal Government, as further recommended by the President.

Scientists and Engineers

LONG-TERM GROWTH IN DEMAND AND SUPPLY

The natural sciences and engineering are so intimately linked to the country's defense and welfare that the strong upward trend in employment requirements in these fields is practically certain to continue. The development and effective utilization of scientists and engineers are crucial not only to the national defense but also to rapid economic growth and to the solution of such urgent social problems as air and water pollution and urban blight. The extension of basic scientific knowledge, essential to continued technological progress, also hinges upon creative research contributions of scientists and engineers.

Employment of natural scientists and engineers reached 1.4 million in 1966, up by more than 125 percent since 1950. This was an even more rapid gain than in professional and kindred employment generally (about 107 percent).

The extremely rapid increase in Federal Government expenditures for research and development—chiefly for the defense, atomic energy, health, and space programs—was the major stimulus to expansion in scientific and engineering staffs during the period since 1950. (See chart 27.) But employment of scientists and engineers rose also on R&D projects financed by private industry, and in production, teaching, and other activities financed only in minor part by the Government. The proportion of scientists and engineers in R&D work is still no more than 2 out of 5 (as compared with 1 out of 4 in 1950).

By coincidence, the proportion engaged in Government work, either as Federal employees or on Government-financed projects, is also about two-fifths for natural scientists and engineers as a group. However, relatively more engineers than scientists are in Government-supported jobs.

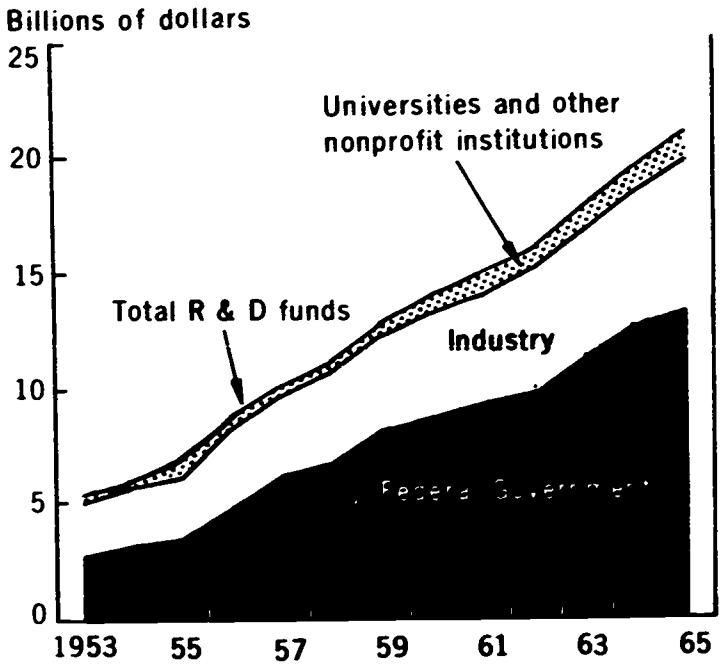
With the Government such a large factor in employment in these professions, the assumptions one makes as to future Government requirements are obviously crucial in looking ahead at personnel needs. Another highly uncertain factor, which affects science and engineering much more than most other professions, is the pace and direction of scientific and technological progress.

The assumptions made on these and other points in the Department of Labor's projections of requirements in these professions are the same as those for professional occupations generally, as discussed above. To reiterate briefly, they include a high general level of employment, a level of defense expenditures like that prevailing before the Vietnam war, and a slower expansion in R&D expenditures than in the recent past.

From the viewpoint of demand for scientific and technical personnel, these are not radical assumptions. Yet the projections based upon them suggest that requirements for engineers may approach 1.5 million by 1975, and requirements for scientists may be in the neighborhood of 650,000. If achieved, these employment levels would represent increases of about 50 percent for engineers and more than 60 percent for scientists above the 1966 employment figures.

CHART 27

The Federal Government provides nearly two-thirds of all funds for research and development.



Source: U.S Department of Labor, based on data from the National Science Foundation

New graduates with degrees in science and engineering are, of course, the main source of added manpower in these professions, but not the only one. Particularly in engineering, a considerable number of professional positions have been filled by upgrading subprofessional personnel or by transferring people from related disciplines. On the other hand, many new science graduates and a relatively small proportion of engineering graduates never enter these fields of work,[7] and a good many members of both professions transfer to administrative positions or other occupations in later stages of their careers.

Illustrative projections of the supply of scientists and engineers in 1975, which endeavor to take account of the various inflows and outflows of personnel, have been developed by the Department.[8] In highly simplified terms, these projections assume a continuance of recent trends in rates of personnel movement into and out of these professions, and also of the recent steady increase in the num-

[7] "Five Years After the College Degree. Part II, Employment" (Washington: Bureau of Social Science Research, Inc., for the National Science Foundation, in process), pp. 16–21.

[8] For a full discussion of the methodology and assumptions underlying these projections, see Neal Rosenthal, "Projections of Manpower Supply in a Specific Occupation," *Monthly Labor Review*, November 1966, pp. 1262–1266.

ber of bachelor of science degrees awarded. In engineering, however, where the number of baccalaureates conferred yearly has fluctuated over the past decade, only a moderate increase in such degrees is envisaged.

For engineers, the projected supply would fall moderately short of the 1975 requirements just discussed (by roughly 15 percent). For scientists, it would be no more than equal the projected demand. The projections thus provide one more strand of evidence as to the need for continued enlargement and strengthening of science and engineering education.

At the postgraduate level, enrollments and number of degrees awarded are rising very fast in both science and engineering. The Ph. D. in engineering is suddenly assuming major importance as preparation for advanced research and teaching. And the increase in new science Ph. D.'s will probably continue to be even greater in absolute though not in relative terms, as indicated by the following figures from the Office of Education:

Year	Number of Ph. D.'s awarded	
	Natural sciences	Engineering
1960	3,346	786
1966	5,760	2,350
1975 (projected)	11,400	6,900

With increases of this magnitude, it should be possible to meet the demand for Ph. D.'s in research positions and also effect much needed strengthening of science faculties in many colleges.

The increase in engineering master's degrees (from little more than 7,000 in 1960 to 14,000 in 1966 and possibly as much as 31,000 in 1975) is another noteworthy development. This trend is part of a broad movement to enrich engineering education and bring it into line with recent scientific and technological advances.

This movement was given impetus in 1955 by the report of a special committee of the American Society for Engineering Education (ASEE).[9] Since then, a large proportion of engineering and technical schools have revised their curricula in directions recommended by the committee, with particular emphasis on expansion and updating of the education provided in mathematics and physical sciences.

How far reaching the change in engineering education has been is indicated by a study of the skill obsolescence problem among engineers conducted for the Department of Labor. "Many of the engineering managers and research directors interviewed * * * stated unequivocally that they find the recent graduates on the R–D–D (research-development-design) staffs more competent and productive than the professionals who attended college earlier, including even those who finished as little as 8 or 10 years ago. And most of these managers attributed this difference in performance directly to the broader and more thorough grounding in higher mathematics and modern basic and engineering science obtained by the recent graduates." [10]

To keep engineering education abreast of the continuing stream of major discoveries in science and technology, another ASEE committee has been conducting a new study since 1962, aided by a National Science Foundation grant. The preliminary report of this Committee on Goals of Engineering Education is now being reviewed within the profession. One recommendation included in the report is that "* * * in the future, four-year bachelor's degree programs be considered 'Introductory Engineering Programs' and that a master's degree awarded for successful completion of a fully-integrated, five-year program be considered the first professional degree. It is expected that to obtain professional status in the fields of design, research, development and teaching this degree will become mandatory." [11] However, for careers in other functional areas—such as operations, maintenance and service, construction, and sales engineering—the bachelor's degree program is still generally regarded as sufficient preparation.[12]

SHORT-RUN SHIFTS IN MANPOWER REQUIREMENTS

A problem which can greatly affect the development and utilization of scientists and engineers is the likelihood of abrupt shifts in manpower re-

[9] "Report of the Committee on Evaluation of Engineering Education," *Journal of Engineering Education*, September 1955, pp. 26–59.

[10] Paul H. Norgren and Aaron W. Warner, *Obsolescence and Updating of Engineers' and Scientists' Skills* (New York: Seminar on Technology and Social Change of Columbia University, November 1966, for the U.S. Department of Labor, Manpower Administration, Office of Manpower Policy, Evaluation, and Research), p. 44.

[11] *Goals for Engineering Education Study, Preliminary Report* (Washington: American Society for Engineering Education, 1965), p. 26.

[12] Norgren and Warner, op. cit., p. 44.

quirements, owing primarily to changes in Government programs. Except for the relatively small amount of basic research sponsored by the National Science Foundation, practically all Government R&D work is "mission-oriented" and thus is inevitably affected by major changes in the defense, space, atomic energy, and other programs.

The sharp effect such changes can have on the technical manpower situation is shown by recent experience. From late 1963 till early 1965, defense contract changes and cutbacks led to layoffs of a good many engineers and other technical personnel, particularly by aerospace companies, and to the availability of engineers and scientists in some specialties and local areas. In 1965, however, an increase in the defense program, added to the needs of the still-growing space program and of the expanding civilian economy, created an intense search for scientists and engineers. According to one survey of companies which engaged in active recruitment, the average firm surveyed was able to obtain only about three-fourths of the technical manpower it sought in 1965.[13]

The scarcity of qualified scientists and engineers was further intensified by mid-1966, according to data from the Federal-State Employment Service system. The number of openings for scientists, engineers, and supporting technical personnel listed with public Employment Service offices increased by nearly 60 percent between mid-1965 and mid-1966, while the number of applicants seeking positions of this kind declined by nearly half. Mechanical, electrical, civil, and aeronautical engineers were actively sought, with those qualified for design or development work in shortest supply. Mathematicians, analytical chemists, and, in general, scientists with advanced training were also in short supply. Employers reported that they were meeting their needs to some extent by lowering hiring standards, by employing applicants above the usual hiring age, or even, in some cases, by employing those who had previously retired.

In concern for these personnel shortages, one must not lose sight, however, of the job-hunting difficulties faced by a good many engineers and scientists less than 2 years before. Studies have been made of the postlayoff experience of the workers displaced by defense cutbacks in several local areas (Seattle, the San Francisco Bay area, Denver, Boston, Long Island).[14]

Three findings of these studies are of particular importance. First, many of the displaced scientists and engineers had prolonged periods of unemployment.[15] Second, the engineers without college degrees, who presumably had achieved professional status through experience in a particular kind of defense work, were often unable to qualify for other professional engineering jobs.[16] And third, getting old was the one and only measurable factor clearly associated with duration of unemployment among the laidoff engineers.

The difficulties experienced by the older men in locating new jobs probably reflected, to some degree, age discrimination in hiring. But the indications are strong that their job-hunting problems were due much more to the obsolescence of their knowledge and skills and the fact that their education was out of date.[17]

OBSOLESCENCE AND UPDATING OF SKILLS

The problem of skill obsolescence is much broader than the job-finding difficulties of displaced older workers, crucial as these may be for

[13] *Technician Manpower Recruitment Practices, 1965–66* (New York: Deutsch and Shea, Inc., 1966), p. 7.

[14] See papers submitted at a National Symposium on Stabilization of Engineering and Scientific Employment in Industry at San Jose State College, San Jose, California, sponsored by the Manpower Research Group, Center for Interdisciplinary Studies, November 1966:

(1) Dr. R. P. Loomba, Results of the San Francisco Bay Area Layoff Study.

(2) Dr. Joseph D. Mooney Results of the Boston Layoff Study.

(3) Mr. Robert Brandwein, Results of the Boeing Layoff Study with Special Reference to Engineers/Scientists.

(4) Dr. Walter E. Langway, Results of the Long Island Defense Layoff Study with Special Reference to Engineers and Scientists.

(5) Dr. Leslie Fishman, Results of the Martin (Denver, Colorado) Layoff Study with Special Reference to Professionals.

[15] Of those laid off in the San Francisco Bay area during the period July 1963 through March 1965, for example, half were out of work for 12 weeks or longer, nearly a third for 18 weeks or more, and about 1 out of every 16 for a year or longer. See Loomba, op. cit., p. 9.

[16] Of the engineers without degrees laid off during 1964 from the Republic Aviation Corporation in Long Island, for example, little more than half had succeeded in obtaining other engineering positions by April 1965, compared with 9 out of every 10 of those with engineering degrees. However, all but a few of the nondegree engineers had found jobs of some kind. See Langway, op. cit., p. 13.

[17] The study of engineers displaced from the Boeing plant in Seattle following the Dyna-Soar cutback showed a steady rise in long-term unemployment from one age group to the next, with a particularly sharp rise past 45. And whereas among the men under 45 possession of an engineering degree greatly reduced the average period of joblessness, those past 45 with or without such a degree had about equally high rates of long-term unemployment. The study concluded that the engineering education of the group over 45 was, in general, too out of date to be much help in competing for reemployment. See Brandwein, op. cit., p. 8.

the individuals involved. This is a period of truly revolutionary outpouring of major discoveries and innovations in science and technology. The accumulation of knowledge is so rapid that fears have often been expressed regarding scientists' and engineers' ability to keep up in their fields to the extent required for really effective functioning in research, development, and design work. The tendency for many of them to be assigned for prolonged periods to narrowly specialized fields of work, often in connection with the defense program, is also regarded as a major factor intensifying obsolescence problems.[18]

Despite the widespread concern about technical skill obsolescence, comprehensive information is not yet available on the extent of this problem nor on the factors contributing to it. To make a start in exploring its dimensions, a pilot study of 39 technology-oriented companies was conducted for the Department of Labor.[19] Following are a few highlights of the findings:

—The skill obsolescence problem is one of "moderate seriousness—at least with respect to the relative numbers of technical employees involved" in this small group of companies.

—Most of the firms (27 of the 39) regarded skill obsolescence among their engineers and scientists as a "major" or "sizable" problem; 8 more classed it as a "minor" problem.

—However, the majority stressed that the problem applies chiefly to their research, [illegible] velopment, and design staffs; that updating is less essential for operations engineers and others concerned only with products and processes already in commercial production.

—Skill obsolescence was reported to be limited, in most though not all firms, to personnel in the 35-and-over group. A reason often given for this fact was that people past 35 attended engineering school before the recent curriculum revisions placing increased emphasis on basic science and mathematics. At the same time, officials emphasized that a sizable proportion of their older professionals were succeeding in keeping up to date.

—Nearly all the 39 firms contacted have educational programs for their engineers and scientists aimed at preventing and remedying obsolescence. All but three have tuition-refund plans, applying to afterhours courses taken at nearby colleges or universities. Two-thirds also have inplant technical education programs.

An issue raised was whether company-sponsored continuing education should be conducted during regular working hours, to meet the needs of employees who do not participate in afterhours programs because of family or other obligations or lack of motivation. A possible alternative, so far adopted by only one of the firms, is providing paid "sabbatical" leave, so technical professionals can pursue full-time updating studies. But most companies said the cost of such arrangements would be too great, unless all competing firms adopted the same policy.

SOME NEEDED DIRECTIONS OF INVESTIGATION AND ACTION

These manifold problems call for progress in at least three general directions—strengthening of preparatory scientific education, new efforts to update the skills of experienced scientists and engineers, and improvements in the mechanisms of adjustment to changing manpower requirements.

In undergraduate education, a particularly urgent need is *expansion and improvement in science instruction in underdeveloped, small colleges.* For lack of financial resources, many such colleges have inadequate laboratory facilities and science faculty members with out-of-date skills and so may fail to evoke in their students a continuing interest in science. A recent study by the American Association of Physics Teachers showed, for example, that physics majors who received their bachelor's degrees at a university had a 1 in 4

[18] Monroe W. Kriegel, "Updating the Training of Research and Development Personnel," *IEEE Transactions on Education* (New York: Institute of Electrical and Electronics Engineers, December 1963), pp. 51–56.

[19] The study was carried out by the Seminar on Technology and Social Change of Columbia University for the Office of Manpower Policy, Evaluation, and Research of the U.S. Department of Labor. It involved depth interviews with technical managers, directors of professional employee development, and other knowledgeable officials in a list of 39 selected firms. Supplementing this investigation, a series of interviews was conducted in technical colleges and universities, professional technical societies, and governmental units concerned with the obsolescence problem. See Norgren and Warner, op. cit.

chance of continuing to the doctorate. But those whose first degrees were from a college (except for a few top-ranking ones) had only a 1 in 20 chance.

A start toward the needed strengthening of science teaching in small colleges, and also in universities not now ranked at a high level, has been made through measures developed by the National Science Foundation. Among these NSF programs are science faculty fellowships, research participation programs for college teachers, and support for undergraduate research participation to permit talented juniors and seniors to act as research assistants or colleagues of faculty members. In addition, under the Science Development Program begun in 1965, the NSF has made grants to a small number of "rising universities" showing promise of becoming outstanding institutions, and to a larger number of "lower ranked colleges and universities" needing a boost in the sciences. There is still a long way to go, however, before high-quality science instruction will be generally available to college students.

The movement to *broaden and elevate engineering education* is another development deserving wide support. Giving young engineers a broad background in mathematics and basic science as well as technical training will help to equip them for creative work and build the flexibility needed in adjusting to changing professional demands. Education in the social sciences also needs greater emphasis in engineering curricula, so as to prepare engineers to deal effectively with urban renewal, pollution, transportation, and other urgent problems having many economic and social ramifications.

The indicated need for *continuing education to prevent and remedy obsolescence of technical skills* poses questions which deserve much more extensive investigation than was possible in the pilot study discussed above, and which also need to be considered from a policy viewpoint by employers, professional organizations, educators, and the concerned Government agencies. Among these questions are:

—What is the full extent and locus of the skill obsolescence and retraining problem in terms of the numbers and types of engineers and scientists affected?

—What more can be learned about why some people keep up to date and others in parallel positions lack motivation or ability to do so?

—What should be the relative responsibilities, financial and otherwise, of the individual, the employer, and the Government with respect to updating?

—More specifically, how can the cost problems which limit the training programs of many companies be overcome? For example, should consideration be given to Federal tax credits to employers who enlarge their retraining programs?

—And to what extent should the Government assume responsibility for updating and retraining of scientists and engineers on Government contracts, either before or after program shifts and consequent displacement of personnel?

Other problems which need further study and policy consideration relate to *measures for easing adjustment problems* stemming from shifts in defense and other Government programs.[20] For example:

—Since adequate warning periods are the first essential for effective adjustment measures, what responsibility for advance notice of project cutbacks or cancellations should be assumed by the concerned Government agencies? Should they take steps to assure that their contractors give employees adequate notice of impending reassignments or layoffs, as many, but by no means all, of these companies have done in the past? And what should be the standard for "adequate" notice?

—How can more speedy and effective matching of displaced workers with available jobs be achieved, not only locally but nationally? In particular, what steps should be taken to increase the use of the nationwide placement network of the public Employment Service system by engineers and other professional personnel and by employers with vacancies for such workers?

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[20] For a further discussion of a number of these questions and issues, see W. G. Torpey, *Report on Retraining Scientists and Engineers*, prepared for the President's Committee on Manpower, 1965.

—What steps should be taken to overcome financial and other barriers to geographic mobility among scientists and engineers as well as other workers?

Though members of these professions already have above-average mobility, the reemployment of those displaced in 1964 was hampered in a good many cases by unwillingness to move (most often because of home ownership). One possibility which deserves consideration is that the cost of moving to take a new job following a layoff from a Government-sponsored project might be regarded as an appropriate charge to that project.

Teaching

ELEMENTARY AND SECONDARY SCHOOL TEACHERS

Since the teaching profession stands at the center of our national effort to bring the benefits of expanding knowledge to all the American people, the serious teacher shortages reported in many communities as schools opened in 1966 are a matter of national concern. These shortages contradicted hopeful predictions made within the past 2 years that shortages of qualified elementary and secondary school teachers would be soon a thing of the past.

The demand for teachers rose by roughly 10 percent between 1965 and 1966, because of the new school improvement programs made possible by the Elementary and Secondary Education Act of 1965 and a growth in enrollments slightly larger than anticipated. At the same time, there was apparently a decline in the proportion of new graduates of teacher training courses who actually went into teaching (presumably because of the availability of other attractive positions). Together, these factors caused severe teacher shortages in many areas. According to information from 39 States that responded in a special survey by the National Education Association in the fall of 1966:

—Twenty States had substantial shortages of teacher applicants; shortages of elementary school teachers were widespread.

—Nine out of 10 States had shortages of mathematics and science teachers, and many lacked teachers of English, foreign languages, and special education.

—Shortages affected communities of every size: 37 States lacked teachers for rural areas; 33 lacked teachers for small cities; 22 for central cities; and 19 for suburbs.

Even States and cities with relatively high salary levels and good fringe benefit provisions had serious shortages, particularly in poverty areas where the need for improvement in educational services is most acute. Thus:

—New York State had a deficit of 12,000 certificated teachers on opening day.

—Chicago had 600 vacancies, 300 of them in Negro districts.

—Los Angeles was short 900 teachers, and the number of teacher applicants was down 38 percent. In the Watts area, over 300 teachers requested transfers to calmer sections of the city and the board of education was considering bussing volunteers to fill the resulting vacancies. Applicants with inadequate qualifications were being hired.

—Philadelphia had an overall vacancy rate in its public schools of 11 percent in 1966; the rate in 67 schools serving underprivileged children was 27 percent. A 1965 experiment in assigning teachers to areas of special need regardless of their preferences boomeranged: one-sixth declined to accept such assignments, and one-sixth resigned after a short period of service.

Prospective Trends in Teacher Demand and Supply

As these illustrations make clear, the teacher shortage problem is only in part a matter of overall supply-and-demand balance. Even more important is providing the special preparation, working conditions, and other incentives which will attract

enough qualified teachers to positions in difficult areas, where their services are most needed.

The sharp increase in college graduations and the leveling off in overall teacher requirements expected during the next few years should help to relieve the situation, however. After 1968, growth in school enrollments will become much slower, and the number of additional teachers needed to man new classrooms will also moderate. Furthermore, the additions to teaching staffs made possible by the Elementary and Secondary Education Act—which boosted teacher requirements by an estimated 50,000 in 1966—will increase for only another 3 years; they are expected to reach 90,000 by 1969 and remain at that figure thereafter. There will, of course, continue to be a large demand for new teachers to replace those who die, retire, or leave the profession for other reasons. But the total number of teachers needed for both public and nonpublic institutions will drop appreciably (from 230,000 in 1966 to less than 200,000 in 1970 and 1975). (See chart 28.)

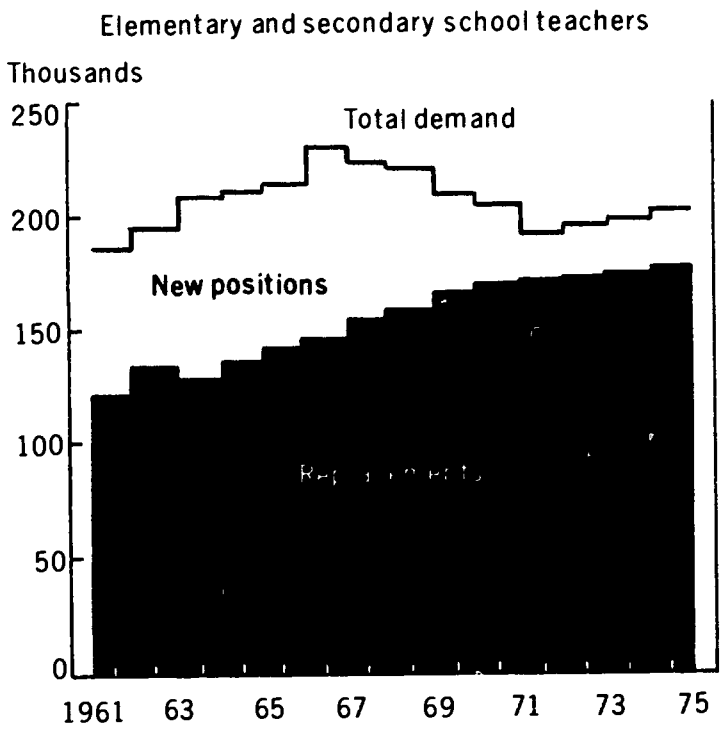
With an increase in college graduations as large as is anticipated over the next decade, the supply of newly trained teachers should be ample to meet this overall demand. In fact, the number of new college graduates is likely to rise so much that the proportion needed to meet the projected teacher requirements may fall sharply. By 1970, this proportion may be as low as 20 percent, compared with around 30 percent in 1966 (assuming that experienced teachers returning to the profession continue to fill about 30 percent of all new and vacant teaching positions as in the recent past).

The prospective ample supply of new teachers should, within a few years, help to reduce present acute shortages of teachers in certain subjects and grades. It also offers opportunity for improving educational services to the disadvantaged, given the needed financial resources and progress in preparing and recruiting teachers for this important field of service.

The increase in teaching and other professional staff which would be needed to cope fully with the educational problems of disadvantaged children has not been quantified in detail. Its magnitude is suggested, however, by an estimate of the National Planning Association that some 2.8 million elementary and secondary school teachers would be needed in 1975 to meet "aspiration goals" in the field of education.[21]

CHART 28

The demand for new teachers is leveling off--will be chiefly for replacements.



Source U S Department of Labor, based on data from U S Department of Health, Education, and Welfare

This illustrative target figure is only moderately higher than the 2.4 million figure on requirements for teachers in public and nonpublic schools in 1975 indicated by the Office of Education projections already cited. In view of the expected increase in college graduations, it is probable that a teaching force of the target size could be attained and, with it, much needed progress in education, if sufficient resources are allocated to this goal by all levels of government.

Enlarged school staffs in professions which are allies of classroom teachers in working with disadvantaged children—school social workers, psychologists, nurses, speech and hearing specialists, and guidance counselors, as well as administrative personnel—are also needed. In all these allied professions, personnel shortages are acute and likely to remain a limiting factor, unless rates of training are greatly increased, with special emphasis on preparation for work with disadvantaged children and youth. Furthermore, the geographic distribution is uneven and there are serious obstacles to mobility, including differences in salaries and opportunities for professional ad-

[21] See page 167 for a discussion of the NPA National Goals Project.

vancement, moving costs, and lack of portability of pension rights.

Teacher Training Programs

A long start toward increasing the supply of teachers, as well as improving teaching of specific subjects, has been made through several federally supported programs.

Teacher training programs supported by Federal funds range from summer institutes to graduate fellowship programs, as indicated by the following figures for fiscal 1966:[22]

Program	*Estimated number of participants*
Total	87,600
Office of Education:	
Teacher fellowships	2,500
Teacher institutes	26,000
Guidance counselors	2,000
Teachers of the handicapped	8,300
National Teacher Corps	1,600
National Science Foundation:	
Teacher institutes	44,000
Cooperative college-school programs	3,200

Programs administered by the Office of Education focus broadly on the need to strengthen elementary and secondary school teaching and staff services. For example, over 600 institutes were conducted in colleges and universities in fiscal 1966 to strengthen participants' skills as teachers of history, geography, reading, and English, in working with disadvantaged children, and in various school service programs. National Science Foundation programs focus on improvement in teaching capacity in science and mathematics.

Additional support for teacher training is provided by the NDEA college student loan program. For each year of teaching after graduation, a borrower is forgiven 10 percent of the loan made to him, up to a maximum of 50 percent. Nearly 100,000 borrowers had applied for such partial cancellation of their indebtedness by the end of fiscal 1965.

Perhaps the most innovative program, and one specifically designed to improve the supply of qualified teachers for children in low-income families, is the National Teacher Corps. Some 50 colleges and universities conducted training institutes in the summer of 1966 to give new college graduates basic teaching skills and experience in working with culturally deprived youngsters. Teachers already experienced in working with such children participated in the training program at the institutes and then returned to their schools to guide the new teacher interns assigned to work there. These interns serve as teacher assistants and tutor children individually and in small groups, besides participating in community work and continuing their graduate education. The Federal Government pays the training and administrative costs as well as 90 percent of the teacher salaries.

By November 1966, over 1,200 corpsmen—including both interns and the teachers who supervise them—were working in 29 States, the District of Columbia, and Puerto Rico, helping to meet the needs of children in both rural and urban schools. They were demonstrating how Federal, State and local governments, schools, and institutions of higher education can work together toward this common goal.

The effectiveness of the National Teacher Corps master teacher-intern teams is attested to by school officials in many parts of the country. The NTC is proving to be a highly practical means of preparing teachers to cope with the problems of impoverished, underprivileged children in situations as diverse as those in New York City, Omaha, and Texas towns. School officials in New Mexico and Texas particularly stressed the contributions of Teacher Corps teams in working with Spanish-speaking children from low-income homes. Others have emphasized, for example, the flexibility of the corps in meeting emergency situations, and the value of the team approach in showing other teachers how to use assistance. In general, the demand from schools for assignment of teams is reported to be much beyond the number available.

For all these reasons, this program authorized by the Congress to the end of fiscal 1967 should be continued and expanded.

Needed Directions of Action

These programs add up to a major contribution to the alleviation of teacher shortages and to improvement in the quality of teacher preparation in many subject fields. The pressing need at this time, however, is for much more rapid progress in overcoming the shortages of teachers, particularly at the elementary and preschool levels, in urban slums and poor rural districts.

[22] Based on data from the U.S. Department of Health, Education, and Welfare and the National Science Foundation.

Following are some of the directions in which action is called for in order to improve teacher utilization and to attract more good teachers to disadvantaged areas:

—*Improvement in teacher salaries* in many areas, to make them more competitive with salaries paid in other fields for personnel with similar qualifications. Particular consideration is needed of proposals to pay special allowances to teachers working in poverty areas which present especially difficult teaching problems.

—*Improvement in the teaching situation in schools in poverty areas*, to stem the crippling outflow of teachers from these schools even when salaries are relatively high. With the aid to schools in poor districts under the Elementary and Secondary Education Act, progress is being made in making teaching in such schools not only tolerable but professionally satisfying. Intensified efforts are needed, however, to effect changes such as:

(1) Reduction in class size and employment of assistant teachers and teacher aides, so that the teacher can give each child the individual attention needed for his educational progress.

(2) Provision of more classrooms and better facilities—modern textbooks, audiovisual aids, in some schools even sufficient desks and chairs.

(3) Increased supportive services—counseling, social work, psychological and health services—to reduce the teacher's burdens in dealing with disturbed and disruptive children and permit concentration on teaching.

(4) Better recreational and community services—including, where necessary, additional police protection for teachers and children in areas with high rates of delinquency and crime.

—*Elimination of discriminatory hiring practices*, which have greatly reduced employment opportunities for graduates of predominantly Negro colleges and for experienced Negro teachers. A National Education Association task force found in 1965 that hundreds of Negro teachers in the South had lost their jobs or been demoted. They also found that over 1,100 young people who completed teacher education in predominantly Negro institutions that year had not been placed by October, even though many cities, including Southern ones, had critical teacher shortages. Special training programs to upgrade the qualifications of some of these graduates may be required and have been undertaken in some localities.

—*Training programs for experienced teachers to improve their skills in working with disadvantaged youngsters.* With the resources currently available under the Elementary and Secondary Education Act, large numbers of teachers have benefited from workshops and other inservice training programs in the specific area of education of the disadvantaged. These programs need to be carefully evaluated so that positive criteria can be established to make sure that they are effective and adequate to meet the needs of educationally disadvantaged children.

—*Programs to motivate and enable more young people to enter teaching in low-income districts.* Judging from the large number of people who applied for the National Teacher Corps—as well as from the experience of the Peace Corps, Vista, and other community service programs—there is a large reservoir of talent among the country's youth which could be tapped for teaching in areas of greatest need.

—*Increased use of teacher aides*, to relieve classroom teachers of routine tasks and also to work with students needing greater personal attention. A particularly promising approach would be to enlist college students in the Work-Study Program to act as homework helpers, study center monitors, and teacher assistants. Hopefully, this group would include youngsters from economically deprived backgrounds, who might thus be motivated to enter teaching and eventually help to achieve better communications between teachers and culturally deprived children.

—*Improvement in teacher placement mechanisms.* In some States, the establishment of a central teacher placement unit in the State Employment Service has broadened the job market for teachers and led to sharp increases in teacher placements. But an integrated

national service might be still more effective in matching available teachers and teaching vacancies. Some insights into the usefulness of a nationwide computer-based system will soon be provided by the teacher referral program which the National Education Association expects to launch in early 1967.

COLLEGE AND UNIVERSITY TEACHERS

Teacher Demand and Supply

Shortages of qualified faculty members are currently a besetting problem for colleges and universities, as well as for the schools. Faced with a sharp rise in enrollments, all but the most affluent institutions, which can pay above-average salaries and provide superior research facilities and other attractions, are having difficulty recruiting teachers in many fields.

According to a survey of over a thousand colleges and universities conducted by the National Education Association during the 1963–64 and 1964–65 school years:

—Nearly 9 out of 10 institutions already faced or anticipated an acute shortage of faculty for one or more teaching fields.

—Close to half had vacancies which had remained unfilled in one or both college years, although funds had been budgeted for them.

—The most acute shortages of qualified teachers were in mathematics, the physical sciences, engineering, and economics. But serious shortages existed also in English, sociology, and foreign languages.

The gap between demand and supply in college teaching partly reflects competition for personnel from industry and government. But the basic reasons for the imbalance are demographic. Most present college faculty members are in age groups born before World War II, when the number of births per year was comparatively low, whereas the mounting student population was born in the period of rising birth rates during and, particularly, after the war. The growing proportion of college-age youth attending college further intensifies the problem.

No abatement of teacher shortages is in sight for the next couple of years. By the end of the decade, however, an easing of faculty recruitment problems is likely. The expansion in college enrollments will moderate by 1969 and, with it, the rate of growth in teacher requirements. At the same time, a very rapid increase can be expected in the supply of new Ph. D.'s.

According to Office of Education estimates, the total number of full-time college faculty members at instructor or higher ranks will need to rise by over 30,000 in the next 2 years (from 267,000 in the current year to 298,000 in 1968–69).[23] In addition, at least 15,000 new faculty members will be needed as replacements (assuming a 3-percent replacement rate). For these needs, colleges and universities should be able to recruit half of the 40,000 new Ph. D.'s expected to become available in this period—clearly an insufficient number.[24]

In the 7 years following 1968–69, however, the required expansion in full-time teaching staffs will amount to little more than 60,000. With replacement requirements added, the demand for new faculty members will total only about 130,000 up to 1975–76.

In recruiting this new staff, institutions will be able to draw on a projected 200,000 new Ph. D.'s. The proportion of these new graduates entering teaching will probably tend to rise. But even if it goes no higher than in recent years, the number of new Ph. D.'s recruited should be large enough by 1975 to ease the overall deficit of college teachers and to increase the proportion of faculty members with Ph. D.'s. Projections prepared by the Commission on Human Resources show, for example, that in 4-year institutions the proportion of teaching faculty with doctorates could reach 55 percent by 1975, as compared with about 42 percent currently.[25]

This projected increase in the supply of Ph. D.'s can be the key to major improvements in faculty caliber and hence in the quality of the education provided on many campuses. The current proportion of teachers with Ph. D.'s is certainly less than optimum, except possibly at a relatively small

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[23] These estimates exclude part-time teaching staff and junior staff. Customarily Ph. D.'s in these groups have primary positions of other types and so are counted in other occupations.

[24] This projection assumes that the proportion of new graduates with Ph. D. degrees entering or remaining in college teaching will be about the same as in recent years. See *Teacher Supply and Demand in Universities, Colleges, and Junior Colleges, 1963–64 and 1964–65* (Washington: National Education Association, 1965), Research Report 1965–R, p. 59; also Folger, op. cit., p. 14.

[25] Folger, op. cit., p. 16 and table 9.

number of the best financed institutions. And the proliferation of knowledge makes this level of education of steadily greater importance as preparation for college teaching.

Current Educational Support Programs and Continuing Needs

The hopeful outlook for expansion in the supply of Ph. D.'s from whom college teachers can be recruited makes it both possible and necessary to focus on personnel needs in particular disciplines, in small and developing institutions, and in the fast-growing junior colleges. As indicated earlier in this chapter, the great majority of full-time graduate students in the natural sciences and engineering get financial support from fellowships, training grants, and research assistantships, whereas fewer than half the graduate students in other fields get such help. In planning future student-support programs, it is important to make adequate provision for all disciplines and for the needs of weak as well as strong institutions.

Substantial Federal aid to prospective college teachers is already available under the National Defense Education Act. Some 6,000 3-year fellowships were awarded under this program in the fall of 1966 to doctoral students planning college teaching careers. In total, 10,500 students are receiving support in fiscal 1967 (including the 4,500 carried over from earlier years). About three-fifths of the support is going to students specializing in the humanities, social sciences, and education; the balance to students in the natural sciences and engineering.

Another important source of Federal financial aid which is helping to increase the supply of college teachers is the National Science Foundation's predoctoral fellowship and traineeship programs. Although these programs are not designed specifically to produce college teachers, the Foundation has for a number of years encouraged teaching by the students aided under these programs, and now permits institutions to give them a limited amount of additional compensation for teaching. Half of the nearly 6,000 fellows and trainees supported in fiscal 1965 reported that they were currently teaching or had had some teaching experience.

A beginning has also been made in helping small and developing institutions to upgrade their faculties under a new program authorized by the Higher Education Act. The 261 National Teaching Fellows appointed under this program in fiscal 1967 are to serve in 95 developing institutions, including a considerable number of predominantly Negro colleges. Highly qualified graduate students and junior faculty members from academically strong colleges and universities have been appointed as fellows for 1 year, with an option to serve an additional year with annual stipends of $6,500 plus dependency allowances. They not only bring an infusion of new teaching talent to the smaller colleges but also enable these colleges to release regular faculty members for advanced study. It is also hoped that some of the fellows will remain in the developing institutions when their terms expire. Altogether, this is a highly promising program, though very small in relation to the total need.

The faculty requirements of junior colleges, which carry an increasing share of the college enrollment load, also deserve thoughtful consideration. These institutions now enroll well over a million students and may enroll 2.0 million by 1975. Properly staffed, they can make an immense contribution to the provision of low-cost, readily available academic and vocationally oriented higher education. According to estimates by the American Association of Junior Colleges, as many as 100,000 new faculty members may be required by the midseventies to handle the staggering, expected rise in enrollments and to replace teachers who retire or leave for other reasons (not counting the large additional requirements expected in adult education programs). But no commensurate provision has yet been made for preparation of junior college teachers.

In the past, many junior college teachers had a public school teaching background. The preference now is for faculty with graduate education especially adapted to the needs of junior college students. And several universities have developed new certificate programs, at a level between the master's degree and doctoral degree programs, aimed at providing such education. However, these programs are still tiny in relation to the projected requirements.

Preparation for junior college positions is also restricted by the fact that under current student-support programs, aid is offered only to those studying for the Ph. D. or an equivalent degree.

Support is clearly needed also for students in the new experimental programs not leading to Ph. D.'s, which are designed specifically to prepare young people for junior college work or for other fields of college teaching.

Needed Improvements in the Academic Job Market

Steps to improve the recruitment and job-finding procedures for college teachers can add substantially to the effectiveness of programs for increasing the supply. Although college teachers are a highly mobile group, the informal channels of communication which now prevail in the academic job market do not meet the needs either of teachers or of smaller and less well-known institutions, according to a study prepared for the Department of Labor.[26]

The professional societies have taken the lead in providing information on job vacancies and job applicants as a service to their members. And they are now cooperating with the U.S. Employment Service to systematize and expand placement services in their respective fields.

A national system focusing directly on the problem of matching college teachers and job vacancies in all college teaching fields might be still more productive in meeting the needs of all institutions and prospective teachers. According to a study prepared for the Association for Higher Education of the National Education Association, a nationwide computer-based system, although complex and expensive, would be feasible. The study also suggested that periodic publication of a bulletin listing academic and professional vacancies, domestic and foreign, would enable applicants to locate jobs more easily.[27]

There is a great need for centralized information, on a national basis, to serve the needs of both teachers and institutions. The different approaches now in use or recommended deserve careful study and evaluation as a guide in planning positive steps to improve the operation of the academic job market.

[26] For a comprehensive discussion of these problems see David G. Brown, *Academic Labor Markets* (Chapel Hill, N.C.: University of North Carolina, 1965. for the U.S. Department of Labor. Manpower Administration. Office of Manpower Policy. Evaluation. and Research).

[27] George E. Arnstein, "Design for an Academic Matching Service" (Washington: National Education Association, Association for Higher Education, in process).

Social Work

The current shortages of qualified personnel in all areas of social work exemplify the recruitment difficulties now besetting the helping professions generally.

Personnel requirements in social work have been increasing for many years, as a result of the growing national effort to make social welfare services available to all in need of them. They have increased particularly fast in the past 4 years, however, because of the new and expanded programs authorized by recent pathfinding social legislation. In 1965, the Task Force on Social Work Education and Manpower appointed by the Department of Health, Education, and Welfare concluded that the gap between needed and available social work manpower had "widened so extensively as to threaten continuation of many vital programs and to delay development of necessary services already authorized."[28]

PERSONNEL DEMAND AND SUPPLY

In 1965 there were about 125,000 social workers. The majority (approximately 60 percent) were employed in State, county, and city government agencies. Only a small minority (20 percent) held master's degrees obtained through 2-year graduate programs. Shortages, especially of social workers with master's degrees, existed in public and voluntary agencies in services to families, children, and the aged; school social work; psychiatric and medical social work; and all other major branches of the profession.

[28] *Closing the Gap in Social Work Manpower,* Report of the Departmental Task Force on Social Work Education and Manpower (Washington: U.S. Department of Health, Education, and Welfare, Office of the Under Secretary, November 1965), p. 77.

The scarcity of qualified social workers may well become still more acute in the next few years. The Task Force on Social Work Education and Manpower estimated the numbers that would be needed to fulfill the intent of the 1962 amendments to the Social Security Act and to augment presently inadequate social work staffs in public child welfare services, schools, hospitals, and other programs in which agencies of the Department of Health, Education, and Welfare are directly concerned. It concluded that "the gap between the available number of social workers with graduate social work education and those estimated as needed by 1970 approaches 100,000 persons." [29]

This estimate did not cover positions which could be filled adequately by college graduates prepared through inservice social work training or through baccalaureate work in social welfare, nor the expanding personnel needs in other governmental and voluntary programs. Furthermore, no allowance was made for the large numbers of new social workers certain to be required to replace those leaving the profession (many of whom leave because of inadequate preparation for the responsibilities they carry).

In comparison with these projected needs, the current levels of training for social work are low indeed. In 1965 the 60 accredited schools of social work graduated only about 3,200 students with master's degrees.

The dimensions of the manpower crisis in social work are thus clearly visible, if not easily remedied. Existing training facilities are simply too limited to meet projected requirements. According to a recent report by a Federal advisory committee, by tripling enrollments under current master's programs by 1975, and opening up 28 new schools, it would be possible to grant nearly 100,000 master's degrees between 1966 and 1975, as against about 20,000 granted in the 1956–65 period. The committee also estimated that, to keep the numbers of faculty and research personnel in line with the desired enrollment increases, the number of doctor's degrees granted would have to rise to 1,200 in the coming decade (as against only 280 granted during the preceding 10 years). It also suggested the establishment of more undergraduate programs in social welfare.[30]

Such an expansion in facilities will require increased financial assistance to social work education. Federal aid to social work schools has been rising but is provided chiefly on a categorical basis—by the Vocational Rehabilitation Administration, the Public Health Service, and the Welfare Administration of the Department of Health, Education, and Welfare. In addition, the funds for expansion and improvement of facilities available under the Higher Education Facilities Act apply to social work as well as to other fields of education. Present urgent needs include both financing of building expansion, under this act or from other sources, and general grants which will permit the schools to develop enlarged and broadened programs.

Substantially increased scholarships and other forms of student aid are essential also, in order to enable and encourage more able young people to enter training. Although many married women return to social work after an absence, enlarged programs of continuing education or refresher courses could be very helpful in stimulating even more of them to reenter the profession.

Still another critical need is for expansion of undergraduate education in social welfare, as preparation both for direct entry of graduates into practice and for graduate education.[31] Only a few colleges now have undergraduate programs in social work, and these differ widely in quality. Yet effective programs at this level could be an important source of recruitment for the profession.

SALARY LEVELS AND WORKING CONDITIONS

The relatively low level of earnings in many areas of social work, and the recruitment difficulties and high turnover rates to which these low earnings contribute, constitute another important element in the profession's manpower problems.

Social work salaries have been considerably improved in recent years, but pay standards remain comparatively low. The median salary in November 1964 for members of the National Associa-

[29] Ibid., p. 79.

[30] Memorandum to John Gardner, Secretary of Health, Education, and Welfare, from Fedele F. Fauri, Chairman, Deans' Advisory Committee to Federal Agencies, Council on Social Work Education, April 28, 1966.

[31] *Closing the Gap in Social Work Manpower,* Report of the Departmental Task Force on Social Work Education and Manpower (Washington: U.S. Department of Health, Education, and Welfare, Office of the Under Secretary, November 1965), p. 80.

tion of Social Workers, over 90 percent of whom have at least 2 years of graduate work, was $8,340. On the other hand, the average starting salary for public assistance case workers in State and local programs, who are usually required to have a college degree, was only $4,325. This was the lowest salary level recorded for any professional group covered by a study of salary ranges in State and local government programs aided by Federal grants. It was below the corresponding figures for employment interviewer, laboratory technician, and public health nurse, all of which are at the low end of the salary scale.[32]

The effect such low salary scales can have in increasing turnover is suggested by a 1965 study of welfare costs in New York State. This study emphasized the extremely high turnover rate among caseworkers, and noted that many move from social work to teaching.[33]

Clearly, an important element in any answer to the recruitment and turnover problems in social work must be to raise salary levels. At the same time, efforts are needed to improve working conditions in some areas. Heavy caseloads and the burden of clerical work often required have been a point of contention among public welfare caseworkers in more than one major city. And there are other difficult problems—relating, for example, to the role of social work in the broad field of social welfare and to the classifications of practice within social work—which need to be clarified in order to encourage recruitment and retention of qualified personnel.

OCCUPATIONAL STRUCTURE

To structure social work tasks so that people with bachelor's degrees can participate in them as fully as possible is another objective dictated by the short supply of personnel with graduate training. It is important to open more opportunities for on-the-job training and significant responsibilities to promising college graduates who could do much of the work of fully qualified professionals. In addition, persons with a high school or junior college education or less can and should be used increasingly in auxiliary positions such as day-care aide, social welfare technician, correctional aide, and community worker.

The use of nonprofessional aides, working under the direction of professionally trained personnel, has increased in recent years in many professions with personnel shortages, especially in the health field. Training for such nonprofessional jobs is being developed under the Vocational Education Act of 1963, and is also provided in projects conducted under the Manpower Development and Training Act. So far, however, very few social work aides have been trained through these programs.

Of greater significance in the area of social work is the approach adopted in the Community Action Programs. These programs train slum residents as neighborhood workers, who can help to reach and communicate more effectively with greatly disadvantaged people.

Inevitably, such innovative efforts to utilize new kinds of auxiliary workers involve some difficulties and problems at the start, including the possibility of an initial added burden on the available social work manpower in supervising and training this new group of workers. But these efforts nevertheless deserve vigorous financial and professional support. They make it possible to extend the range of services available through local social welfare programs. And they open up much needed opportunities for meaningful employment to previously underutilized and disadvantaged men and women, not only as an immediate source of new jobs but also as a potential means for moving up the job ladder.

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[32] *Closing the Gap in Social Work Manpower,* p. 73, citing *State Salary Ranges, January 1, 1965* (Washington: U.S. Department of Health, Education, and Welfare, Division of State Merit Systems, January 1965).

[33] *Closing the Gap in Social Work Manpower,* p. 72, citing *Welfare Costs* (Albany: New York State Citizen's Committee, 1965).

Health Manpower

The health services available to the people of this country are now being adversely affected in both quantity and quality by shortages of physicians, nurses, and other trained health workers. Public concern with regard to the scarcity of health personnel probably centers on the medical and nursing professions. But the need for additional manpower is acute also in many other professional and supporting occupations in hospitals and nursing homes and medical and dental offices and laboratories—which together make up what has come to be known as the health service industry.

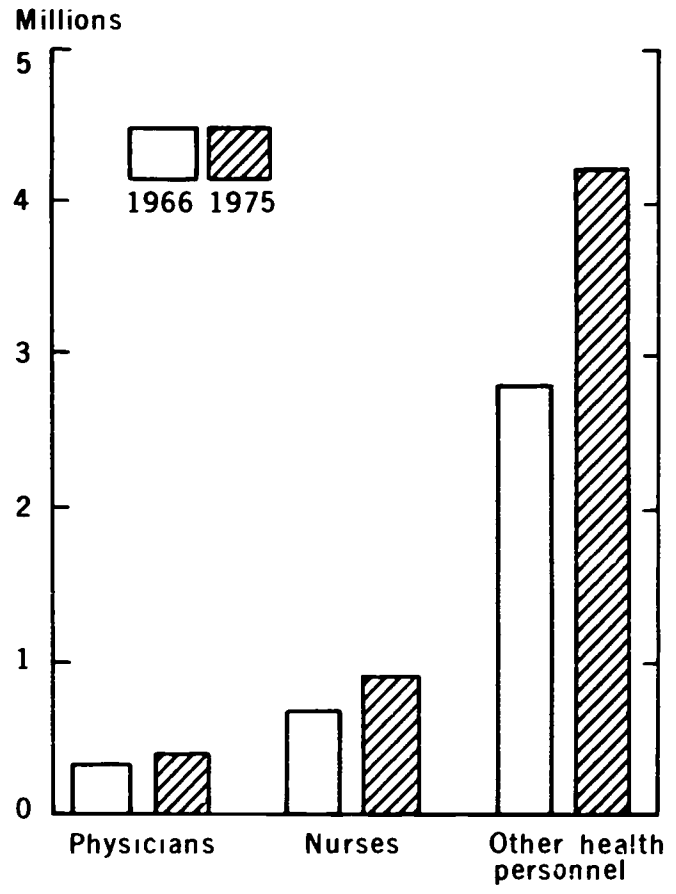
Under pressure of the constantly mounting demand for health care, employment in the health service industry has been rising for many years. In 1966, it reached about 3.7 million [34]—making this one of the largest sources of employment in the national economy. And a gain of another 1.7 million jobs in the health services industry is anticipated by 1975. (See chart 29.)

The forces underlying the growth in demand for health services are powerful—so strong, in fact, as to generate continuous pressure to expand these services to the limit of available manpower or even beyond. Rapid population growth, particularly in the youngest and oldest age groups, which are those needing the most health care, and the country's growing affluence are the basic factors underlying the steadily rising demand for health services. In addition, popular awareness of the value of health care is increasing. The expansion of health insurance coverage has helped to finance this care; a large majority of Americans now have some coverage under health insurance plans. Government subsidies for hospital construction have also raised manpower requirements, as has increased Government support of research and development in medical and related fields. The recently enacted Medicare program and the expansion of health services for low-income persons under the amended Social Security Act (Medicaid) are additional sources of demand, as are the health service centers in ghetto areas in several major cities made possible by the Economic Opportunity Act. Finally, a major expansion in the number and capacity of nursing homes over the next decade will further increase requirements.

The rapid growth in personnel requirements poses the threat of a widening personnel gap in many health service occupations. To help in meeting current and anticipated manpower needs, several new measures of Federal aid for the training of health service personnel have been authorized by the Congress during the past 4 years. And in 1966, the President directed the initiation of a broad new program of factfinding and action. This Presidential program (discussed later in this chapter) is designed both to increase the supply and to improve the utilization of personnel in essential health occupations through cooperative action by the Government and all concerned groups.

CHART 29

The need for health service personnel will rise sharply in the coming decade.



Source U S Department of Labor

[34] Including private wage and salary, government, self-employed, and unpaid family workers. Another 400,000 workers in health occupations are employed outside the health service industry. Many of these workers are employed in health units of manufacturing and trade establishments, in pharmacies, and in research laboratories.

The measures undertaken to meet the growing demand for health service workers can, at the same time, help to relieve another of the Nation's critical manpower problems—the existence of unused human resources. Health service jobs offer one of the largest fields of employment opportunity for disadvantaged men and women with limited education. Already, through federally aided training and related programs, jobless workers with educational and cultural handicaps are being developed into assistants and aides of various types—whose employment is urged by health authorities as a means of improving the utilization of scarce professional personnel.

PHYSICIANS

The current shortages of physicians, particularly in certain specialties and local areas, have been widely reported. Quantitative measurement of these shortages is peculiarly difficult, however. Since more than three-fifths of the 280,000 physicians [35] professionally active in the United States as of 1966 are in private practice, counts of vacant positions in hospitals, government agencies, or elsewhere are no full measure of the shortage problem in this profession. And assessments of unmet needs for medical care involve both theoretical and practical difficulties.

One possible index of the availability of physicians—their ratio to population—has remained substantially unchanged, at 150 per 100,000 people, in the country as a whole in recent years. But this average figure conceals widely differing situations in different local areas, medical specialties, and work activities. Data from the U.S. Public Health Service show, for example, that there are nearly 50 percent more physicians per 100,000 population in the Northeast region than in the South. The shortage of doctors is undoubtedly much more acute in medium-sized and small communities than in metropolitan areas. Many such communities completely lack physicians qualified in important medical and surgical specialties.

The Public Health Service has analyzed the needs for physicians to improve standards of care, based on the staffing patterns of six prepaid group-practice organizations.[36] This study indicated unmet needs for about 20,000 to 30,000 physicians, primarily in the fields of family practice, internal medicine, and pediatrics. Furthermore, specialists in almost every one of the 30 recognized medical specialties have indicated concern for unmet needs in their particular fields.

The continued rapid growth in requirements for physicians anticipated up to 1975 has been projected by the Department of Labor (taking into account the demand factors already mentioned and several additional ones, including the needed expansion in medical school facilities, growth of medical research, and the probable impact of technological developments on the profession). Altogether, it is estimated that the number of professionally active physicians will need to rise to about 375,000 by 1975, or by 95,000 above the 1966 figure, and that another 45,000 will be required to replace those who die or stop practicing for other reasons. In other words, the number of new physicians needed will average about 15,600 per year between 1966 and 1975.

In contrast, the number of physicians entering the work force would average only about 9,000 per year during this period, if the medical schools were to continue operating at their current capacity and if, as seems likely, immigration of physicians continues at about the same rate as in recent years. Thus, a substantial rise in medical school graduations—in the neighborhood of 6,600 per year—would be essential to meet the projected requirements.

Fortunately, an expansion in the medical schools is already underway, with aid authorized by the Health Professions Educational Assistance Act of 1965. Enrollments will be increased by about 1,000 per year by projects already funded or approved, and further expansion will be possible under this act. Additional funds beyond those already authorized, as well as active leadership in the profession, will be needed, however, to meet fully the indicated requirements. And even if this is accomplished on a national basis, the medical needs of many small communities may not be adequately provided for. A problem area in

[35] Includes physicians with M.D.'s only.

[36] "Health Manpower Perspective: 1966." Report of the Health Subcommittee of the Departmental Task Force on Manpower Requirements and Training Programs (Washington: U.S. Department of Health, Education, and Welfare, in process).

which there is urgent need for innovative and experimental action is that of meeting medical needs in sparsely settled regions and small communities not close to metropolitan centers.

PROFESSIONAL NURSES

More attention has probably been focused on the shortage of professional nurses than on that of any other health occupation. Some hospitals have actually had to close facilities because of inability to fill nursing vacancies.

According to a survey conducted by the American Hospital Association and the U.S. Public Health Service, hospitals had urgent needs for about 80,000 more professional nurses in 1966. A parallel study in nursing homes, conducted by the Public Health Service, indicated urgent needs for an additional 5,000 nurses.

Furthermore, in nursing as in medicine, personnel shortages tend to be much more acute in small cities than in metropolitan centers and to be considerably worse in some regions than in others. According to data from the Public Health Service, the ratio of nurses to population is only about half as great in the South as in the Northeast.

In looking ahead at future requirements for professional nurses, the Department of Labor has taken into account the same factors of growing population, rising expenditures for health care, and technological developments of many kinds which entered into the projections for physicians. Other special factors have been considered, including the tendency for hospitals and nursing homes to use greater numbers of practical nurses, aides, and attendants (because these workers are not in as short supply as professional nurses and have lower salaries). Allowance has been made also for the number of nurses needed to eliminate the present shortages, but not for further improvements in standards of care.

On this basis, it is projected that employment of professional nurses will need to rise from the 1966 figure of 620,000 to about 860,000 by 1975. In addition, an estimated 150,000 nurses will be needed to replace those who die, retire, or leave the profession to take care of their families or for other reasons.[37] In nursing, as in most other fields staffed predominantly by women, large numbers leave each year because of family responsibilities. But there is also a large and helpful return flow of former nurses to the profession. The replacement figure just cited is a net one—the difference between the total number of nurses expected to leave the work force between 1966 and 1975 (roughly 300,000) and the number expected to return to the nursing field (estimated at 150,000).

The number of new nurses required per year to fill additional positions and to meet net replacement needs will average about 43,000 between 1966 and 1975, according to these projections. In comparison, about 35,000 nurses graduated from nursing schools during 1966, not all of whom entered nursing. Thus, an increase of at least 8,000 per year in nursing school graduations would be needed to meet the indicated requirements.

Such an increase should be within reach of accomplishment in view of the rapid growth in the college-age population and in college graduations as a whole which will take place during the next decade. How many students actually enter nurse training will be much influenced, however, by the extent of improvement in salaries and working conditions in the profession, as well as the provision for loans and other aid to nursing students.

The Nurse Training Act of 1964 has already opened the door to increased student aid. But the problem of improving the economic situation and climate of employment in the profession is much more difficult and far reaching. Pay standards and conditions of employment in nursing have definitely lagged behind those in other fields of work with less demanding educational and training requirements. Fortunately, salaries are beginning to be raised in some areas. At the municipal hospitals in New York City, to cite one instance, the starting rate for registered nurses was moved up from $5,150 a year in 1965 to $6,050 in January 1966, and was scheduled to go to $6,400 as of January 1967. Recently, sharp increases were also gained in the San Francisco area—to reach $7,200 a year as of April 1967 in private hospitals. In most cities, however, salaries are still much below

[37] The number of nurses required to provide optimum standards of care would be much higher than this, according to unpublished estimates which bring up to date the projections of the Surgeon General's Consultant Group on Nursing, in *Toward Quality in Nursing: Needs and Goals* (February 1963). These estimates show a need for 1,000,000 nurses by 1975 and for an additional 200,000 for replacements.

these figures. Other sources of dissatisfaction among nurses include the fact that even those with extensive experience rarely participate in the direction of hospitals or receive much broad professional recognition, that overcrowding and understaffing impose heavy burdens, that duties of a routine or even menial sort are frequently required, and that hospitals in the major cities are all too often dilapidated and located in dangerous neighborhoods.

The need to upgrade salaries and working conditions in hospitals is apparent. Improvements in these directions can have an important effect in reducing turnover and encouraging more former nurses to return to duty, besides helping to attract more young people to the profession.

OTHER HEALTH OCCUPATIONS

At least 15 health occupations besides medicine and professional nursing had a critical demand for manpower in 1965.[38] And workers in these occupations continue to be extremely scarce in communities across the Nation.

The occupational groups in short supply include dentists and other professional practitioners, bacteriologists and certain other scientists, technicians of several kinds, and practical nurses and ward attendants. All these fields have been affected in some degree by the mounting demand for health services. But among scientists, personnel shortages in health-related positions are part of a general scarcity of personnel. In some fields in addition to medicine, limited facilities for training have been an important factor. And turnover is high not only among nurses but also in some technician and other occupations staffed largely by women.

Outside the top professions, however, the foremost reason for the current personnel shortages is economic—jobs in the health industry generally offer lower pay and less attractive employment conditions than other fields of work calling for comparable educational preparation. Low wages and salaries, coupled with a general lack of career advancement opportunities and many problems with respect to working conditions, make it difficult for hospitals and nursing homes to attract or retain efficient workers.

In the lower level supporting occupations in these establishments, substantial numbers of employees earn less than the minimum wage of $1.40 per hour recently established for workers in most other industries. The Fair Labor Standards Act Amendments of 1966 extended minimum wage protection to most hospital workers for the first time, but set their hourly minimum initially at $1.00. The minimum wage for hospital workers will not catch up to that for workers previously covered by the law until 1971, when the minimum for all covered workers will be $1.60.

Most employees of hospitals and nursing homes also lack other important protections. The great majority are not covered by unemployment insurance. Many are not covered by the Federal Old Age, Survivors and Disability Insurance program or by State workmen's compensation laws. And most are outside the scope of the National Labor Relations Act and parallel State laws protecting collective bargaining rights. The result is a disparity, not only in earnings but also in other aspects of economic security, between hospital and nursing-home employees and workers elsewhere.

PROGRAMS TO DEVELOP HEALTH MANPOWER

During the past several years, and especially in 1966, important steps have been taken toward increasing the supply and improving the utilization of health manpower.

The Health Professions Educational Assistance Act of 1963, the Nurse Training Act of 1964, and the Allied Health Professions Personnel Training Act of 1966 were designed specifically to help in expanding the training of physicians, dentists, nurses, and other professional personnel. The assistance made available by these acts includes grants for construction and expansion of training facilities, payments to institutions for conducting training projects, and tuition loans and other forms of student aid.

In addition, programs authorized by the Manpower Development and Training Act and the Vocational Education Act of 1963 have helped to relieve the immediate shortages in occupations

[38] This list of demand occupations, developed by the Bureau of Employment Security of the U.S. Department of Labor, is as follows: Physician, dentist, clinical psychologist, physical therapist, occupational therapist, dietician, parasitologist, chemist, bacteriologist, pharmacist, medical technologist, registered nurse, X-ray technician, dental hygienist, dental technician, practical nurse (licensed), and ward attendant. In addition, the U.S. Public Health Service lists medical record librarian as well as many of those above as being an occupation in short supply.

below the professional level. And projects conducted under the MDTA have also provided some refresher training for professional nurses, to facilitate their return to active practice. Altogether, MDTA projects provided for the training of approximately 63,000 persons in health-related occupations between late 1962 and the end of 1966. (See table 4.)

The Neighborhood Youth Corps has also provided work training in the health and medical service field for many disadvantaged youth. In fiscal 1966, an estimated 20,000 NYC enrollees had jobs in public and private, nonprofit hospitals; health departments; clinics; and other medical installations. The jobs they performed helped to ease manpower shortages by relieving more highly trained personnel of unskilled and routine but necessary tasks. Their work assignments included jobs as ward attendants, orderlies, X-ray technician aides and dental technician aides, as well as various clerical and maintenance aides.

TABLE 4. AUTHORIZED TRAINEES IN HEALTH OCCUPATIONS FUNDED UNDER THE MDTA, AUGUST 1962–DECEMBER 1966

Occupation	Number
Total	63,036
Professional nurses (refresher training)	4,723
Licensed practical nurses	20,695
Nurse aides/orderlies and related occupations	30,028
Nurse aides/orderlies	27,220
Clinical assistants	120
Home attendants	448
Housekeepers (medical service)	1,654
Ward maids	378
Other attendants	208
Specialized technical aides	7,123
Dental technicians	491
Dentists' assistants	765
Medical laboratory assistants	544
Medical records aides	151
Medical technicians	147
Occupational therapy aides	145
Psychiatric aides	2,978
Special diet workers	440
Surgical technicians	925
X-ray technicians	132
Others	405
Health clerical	467
Ward clerks	320
Secretaries and others	147

The establishment of the President's Committee on Health Manpower and the National Advisory Commission on Health Manpower in May 1966 initiated a new dimension of action.[39] The President directed these groups to appraise the requirements for health manpower and the availability and utilization of personnel in this field, and to make recommendations for improvements to meet the health needs of the civilian population and the Armed Forces. At the same time, he directed that an interdepartmental effort be made to improve the utilization of health manpower by Federal agencies, and that the feasibility of establishing a national roster of draft-eligible doctors be explored by the Department of Labor. A study of federally aided training programs to determine how they can be better focused on health manpower shortages was also initiated in 1966, by direction of the President. He also requested an intensive study of hospitals which make efficient and economical use of nurses and other health workers, so that other institutions can be enabled to benefit from their experience.

Innovative training of new types of health workers who would help doctors to do more has also been called for by the President. In his message on America's Children and Youth in February 1967, he recommended that 10 pilot centers be set up to conduct research and development in child health care, provide needed maternal and child health care, and also train personnel of new kinds to assist pediatricians and obstetricians. The President further directed the Secretary of Health, Education, and Welfare to allocate increased funds to help train more pediatricians, obstetricians, and family doctors.

Efforts to expand the supply of health workers are accordingly proceeding on many fronts. Measures aimed at recruiting more inactive professional nurses and medical technologists and providing them with refresher training are receiving particular emphasis. Training for practical

[39] The President's Committee is composed of the Director of the Office of Science and Technology; the Secretary of Defense; the Secretary of Health, Education, and Welfare; the Secretary of Labor; the Administrator of Veterans Affairs; the Director of the Office of Economic Opportunity; the Director of the Office of Emergency Planning; and the Director of the Selective Service System. The National Advisory Commission on Health Manpower consists of leaders in the health professions and representatives of universities and other sectors of private life.

nursing and other health occupations is being substantially increased in federally supported programs. And a variety of studies aimed at providing guidelines for further action are being carried out.

SOME NEEDED DIRECTIONS OF ACTION

When the groups established by the President submit their reports later this year, they are expected to make recommendations for further action, drawing upon the findings of the studies now in progress. As this chapter makes plain, however, a number of persistent problems affecting the health manpower supply are already apparent.

The most basic need is to *raise pay scales* as widely and rapidly as possible. By 1971, increases in the minimum wage applying to hospitals and nursing homes, provided for under the recent amendments to the Fair Labor Standards Act, will largely eliminate the worst problems of substandard wages in such establishments. In the meantime, voluntary wage increases to bring minimum pay scales to the level required in other industries would help greatly in personnel recruitment. The need for salary increases, to levels commensurate with their education and responsibilities, is equally urgent for nurses and other personnel in salary brackets above the minimum.

Encouragement of *sound collective-bargaining procedures* in labor disputes involving health workers is also needed. During 1966 many workers in hospitals and nursing homes stopped work in protest against low wages and salaries and unfavorable working conditions. In some instances, the striking workers won substantial wage increases and other gains, and they usually made efforts to provide emergency care for patients. Maintenance of adequate care was sometimes unavoidably threatened, however. And several organizations of health employees are reported to be considering the revocation of no-strike pledges in their bylaws. In view of the public interest in maintaining uninterrupted patient-care services, public authorities and private groups need to encourage effective collective bargaining, in order to avoid work stoppages among health workers.

The *extension of social insurance* to health workers is another area in which action is needed. The proposed Unemployment Insurance Amendments of 1966, which would have facilitated the extension of State unemployment compensation laws to employees of nonprofit hospitals and nursing homes, were passed by both Houses of Congress but not finally enacted. Renewed efforts to enact such legislation are expected in 1967. They should be accompanied by efforts to extend to workers in the health service industry the protection of other social security laws, and of legal guaranties of their collective-bargaining rights.

Increases in pay scales and social security benefits for health workers will, of course, raise the total wage and salary bill—the major component in operating costs—of hospitals and nursing homes. Resulting increases in the cost of patient care, which is already mounting more rapidly than that of most other goods and services, will be hard to avoid. As hospitals and nursing homes increase their employees' compensation, they are likely to face the necessity of either effecting economies or raising their charges if they are to continue in operation.

The most promising approach to the solution of this dilemma lies in *productivity improvement.* Substantial productivity gains mean that fewer workers can provide the same quantity and quality of patient care, so that even with a rise in pay scales a hospital's total wage bill may not be significantly higher than before.

Studies conducted by the Department of Labor and the Public Health Service show that there is real potential for productivity gains through improved managerial practices in the utilization of health manpower, and also through wider use in patient care of new automated equipment and other technological innovations.[40] It will take much time and effort, however, to achieve these gains in the great numbers of hospitals and nursing homes throughout the country. Federal, State, and local government agencies, as well as professional and other organizations in the health field, will need to work together in furnishing technical and financial assistance to individual hospitals and nursing homes in order to realize the possible productivity improvement. New legislation would also be desirable to expand the very limited present provision for financial assistance for such purposes under existing Federal aid programs.

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[40] Herman M. Sturm, "Technological Developments and Their Effects Upon Health Manpower," *Monthly Labor Review,* January 1967, pp. 1–9.

Progress in increasing the productivity and availability of health manpower will occur slowly without the active cooperation of organizations and individuals concerned with these problems "at the grass roots" in local communities—working with government agencies and national and State associations. At two national conferences focused on health manpower problems—the White House Conference on Health (November 1965) and the Conference on Job Development and Training For Workers in Health Services (February 1966)—the importance of cooperation among individuals representing a wide spectrum of interests and viewpoints was demonstrated. One of the important points brought out by the 1966 conference was the need to inform health authorities and planners in local communities about the financial and other resources available to help in manpower development. Participants at this conference also particularly recommended the establishment of permanent machinery in local communities, through which representatives of the health professions, educational institutions, and local government, as well as management and labor, could collaborate in improving the supply and utilization of personnel in health services.

U.S. GOVERNMENT PRINTING OFFICE : 1967—O-282-298

WHERE TO GET MORE INFORMATION

Copies of this publication or additional information on manpower programs and activities may be obtained from the U.S. Department of Labor's Manpower Administration in Washington, D.C. Publications on manpower are also available from the Department's Regional Information Offices at the addresses listed below.

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